

An Analysis of the Relative Importance of Ely's Eight Implementation Conditions

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Abstract

This paper reports the results of a study to determine implementation profiles within a sample of 179 participants from a variety of education and business fields. Implementation profiling identifies the conditions that participants perceive are most important when implementing an innovation. Information about the relative importance of the eight conditions is important because it could lead to the development of implementation plans tailored to specific demographic characteristics of an organization. The eight conditions, developed by Ely (1990, 1999), are: dissatisfaction with the status quo, skills and knowledge, time, resources, rewards and incentives, participation, commitment, and leadership. This study builds on Ely's research by determining the relative importance of each of the conditions by age, gender, ethnicity, educational degree, career field, and technology proficiency. This paper describes the implementation profiles of the demographic groups, discusses several statistically significant differences between the groups, and includes recommendations that can be used for the design of effective implementation plans.

An Analysis of the Relative Importance of Ely's Eight Implementation Conditions

The field of instructional design is often described as a process with five phases: Analysis, Design, Development, Implementation, and Evaluation. Much has been written about most phases in the instructional design process, but the implementation phase still remains a mystery to most instructional designers. Implementation involves the introduction of an innovation, which can be a new process or a new technology, into an organization. Continued use of the innovation is dependent upon successful implementation. Successful implementation refers to the extent to which the innovation is continued and integrated into the structure of the institution and is dependent upon the quality of the implementation process (Rogers, 1995; Fullan, 1982).

In this paper, we will describe a study into the implementation conditions that are most important to various groups. Understanding the importance of the conditions to various groups is important because this information can allow change agents to develop implementation plans that are tailored to specific organizations. The paper begins with a review of the literature related to the implementation process. Within the literature review, we include a section devoted to the eight conditions for implementation (Ely, 1990, 1999). Following this, we include a discussion of the research method, including research questions, participants, the research instrument, and the procedure used in this study. The results of the study are reported in the next section. Results are reported for the overall sample and for each demographic group (e.g., Age, Gender) in the study. This paper includes a discussion of the major findings of the study and concludes with limitations of the study and suggestions for future research.

The Implementation Process

Consideration of the social and technological contexts that exist within an organization is important when developing an implementation plan. Change agents must be aware of the organizational dynamics that are involved with implementation. The environment, values, and culture of the organization should be compatible with the change. Without consideration for the process of implementation, and the environment for which it is intended, it is probable that an innovation's use will decline and the innovation will eventually fail. Success is not determined by the innovation's merit alone. An innovation that is effective in one setting may be adopted for use in another based on evidence of its success. However, without an effective implementation plan, even a superior innovation might fail (Surry & Ely, 2002). Change agents and end-users play a pivotal role in the implementation process. Everyone involved must agree on the need for change (Fullan, 1982).

Change brings about uncertainty because it forces people to deal with new concepts, policies, procedures, and ideas. It is not uncommon for change to be viewed as a personal or professional challenge, or even as a threat to a person's position within an organization. Therefore, the implementation of an innovation must allow for variability (Boddy & Macbeth, 1999). The characteristics of the physical environment, political structures, and social culture of the organization affect the process of implementation (Boddy & Macbeth, 1999; Ash & Burn, 2002). Organizations involved in change should consist of a unified, cooperative internal structure (Clayton, 1997). The environment must be one that is accepting and open to the change. Although the new technology or process may be exceedingly effective, the success of the

implementation process determines the ultimate success of the implementation (Surry & Ely, 2002). Effective planning influences effective management of the implementation, and therefore results in successful implementation (Mabert, Soni, & Venkatarmanan, 2003). A stable foundation that is conducive to implementation will continuously have an effect on the successful implementation process (Clayton, 1997).

The implementation of an innovation depends, in large part, on the end-users' perceptions of the innovation (Hall & Hord, 1987). End-users must recognize an innovation's relevance, advantages, and feasibility (Scott, 2000). The perspective of the change agents must reflect an understanding of the end-users' attitudes and concerns (Hall & Hord, 1987). Individuals require the knowledge and skills essential to the implementation of the innovation, necessary resources, and time to train and apply the new information. They might require formal training, workshops, additional support staff, or external assistance in order to be successful. The commitment of the end-users is fundamental to successful implementation and is a result of the support of the administration. By being directly involved, end-users have a pragmatic perspective of the changes being implemented. Their concerns are realistic and based on direct experience; therefore, management and evaluation of the implementation process should encompass an understanding and evaluation of the end-users' concerns. Because the end-users' roles are indispensable to successful change, supervisory support, an understanding of the need for change, and the end-users' participation and commitment, are fundamental to the implementation process (Fullan, 1982). The attitudes, perceptions, values, and cultures of all involved must be examined and respected to prevent possible barriers to successful implementation (Fullan, 1982; Hall & Hord, 1987). Successful implementation is more likely if individual needs and goals

correspond with those of the institution adopting the change (Scott, 2000). The rewards of implementing the innovation must exceed the cost (Fullan, 1982).

The interactive approach to implementation involves creating opportunities for the end-users to become actively involved in the decision-making process. Supervisors, or management, might set the general parameters for development, but the development and implementation processes of change ultimately become the responsibility of the end-users (Brakels et al., 2002). As a result, when the process of implementation begins, those affected by the change, and ultimately responsible for implementing it, will possess a sense of ownership, responsibility, and commitment towards its success (Brakels et al., 2002; Goodison, 2002; Scott, 2002).

Ely's Eight Conditions for Implementation

Based on research into the implementation of educational technologies, Ely (1990, 1999) developed a list of eight conditions he found to facilitate implementation and that are present in successful implementation processes. These conditions are: (1) to be motivated to accept change, there must be dissatisfaction with the status quo, (2) all involved in the implementation process must have adequate skills and knowledge, along with (3) sufficient resources and (4) time to train, practice, and apply the innovation, (5) rewards and incentives exist, (6) participation in the decision-making process (7) commitment from senior management and administrators, and (8) day-to-day leadership through support, encouragement, and procurement of resources, by direct managers.

Because resistance is often an inevitable response to change (Hedge & Pulakos, 2002), the presence of Ely's eight conditions during the implementation process provides a proactive

environment that facilitates change and reduces the influences of barriers that are resistant to change (Ely, 1999). However, certain conditions appear to be more important to some individuals than the other conditions (Surry & Ensminger, 2002). The dynamics and characteristics of the end-users result in differing perceptions regarding the relative importance of each condition before implementing the innovation. By determining the conditions that are the most important to a group of end-users, change agents can more effectively design a plan for successful implementation.

Ensminger and Surry (2002) conducted a study to determine faculty members' perceptions of the importance of Ely's eight factors when implementing online degree programs. The results of the study indicate that faculty perceive all eight conditions as important for the implementation process. Availability of resources, rewards and incentives, and participation ranked as the most important conditions for faculty when implementing online degree programs. The perception of the importance of participation suggests that faculty want to be involved in making the decisions regarding their transitions from in-class to online teaching. Surry and Ensminger (2002) also conducted a study to evaluate the perceived importance of the eight conditions in business versus educational settings. The results of thire study indicated that Ely's conditions can be generalized to additional settings, such as businesses, but with varying degrees of perceived importance when compared with educational professionals. For example, participants from business organizations ranked training time, leadership, available resources, and skills and knowledge as the most important conditions while participants from educational institutions perceived availability of resources, participation, and skills and knowledge as the most important conditions. The perception of importance for certain conditions was significantly different

between the groups. Time was ranked as the most important condition by the business professionals, but ranked as the seventh most important by educational professions. Additionally, participants in the business group considered participation as the least important condition, while the education grouped ranked it as the second most important.

The results of prior research indicate that Ely's eight conditions are necessary for the successful implementation of innovations in a variety of settings. The literature also shows that members of different demographic groups differ in their perceptions of the relative importance of the conditions. Based on these conclusions, we designed a study to confirm that there were differences between demographic groups as to the relative importance of the conditions and to determine the nature of those differences, if any.

Method

Research Questions

We had two primary research questions for this study:

- 1) What is the rank order of importance for Ely's eight implementation conditions for this sample?
- 2) Are there differences in the relative ranking of the eight conditions for the following demographic groups
 - Age
 - Gender
 - Ethnicity

- Educational Level
- Career Field
- Technological Proficiency

Participants

This study collected data from 179 participants. Most of the participants in the study were members of electronic mailing lists related to instructional design. Messages were sent to several lists requesting participation in the study. The participants ranged in age from younger than 20 to over 65 years. Eighty-six females and 54 males participated in the study (39 participants selected the option not to specify their gender). Over 75% of the participants were Caucasian. The highest educational degrees of the participants ranged from high school diploma, or equivalent, to doctoral or professional degrees. The participants were from a wide variety of career fields including K-12 education, higher education, business and industry, active duty military, government, and self-employed. There were 109 participants from educational fields and 54 from either business, military, government, or self-employed careers. Most participants, over 95%, reported themselves as having average to very high levels of technology proficiency.

Instrument

A 56-question instrument was used in the study. The instrument presented a hypothetical situation of technological change and used a “forced choice” format. Under this format participants were presented with a pair of statements related to two of the eight conditions and were required to select which statement they identified as more likely to facilitate their use of the innovation. Each condition was presented in relation to each other condition twice. As a result,

participants could score from 0 to 14 on each of the eight conditions. A score of 0, for example, meant the participant never selected the condition while a score of 14 meant the participant selected the condition every time it was presented as an option.

Prior to this study, the instrument was tested for validity and reliability. To ensure validity, the statements used in the instrument were sent to seven experts in the area of change and implementation. The experts rated each question on a five-point scale from “low validity” to “high validity” and included narrative comments on how to improve each statement. Based upon the scores and feedback, 21 statements were rewritten to eliminate confusion or to make them more closely related to constructs being measured. The original statements that were highly rated by the expert reviewers and the modified questions were included on the final instrument (Surry & Ensminger, 2004). A test-retest reliability study was also conducted. Thirty-eight participants completed the instrument on two different occasions, two weeks apart. The scores on Test 1 and Test 2 were correlated at a statistically significant level. The mean correlation for the instrument was .747 (Porter, Surry, & Ensminger, 2003).

Procedure

Participants completed the instrument online using a web-based form. After completing the instrument, participants were provided information about their scores on each condition. Results were stored in database. Descriptive data from the participants’ scores on all eight conditions were analyzed to determine overall perceptions of the importance of each condition. Analysis of variance was conducted to determine if there were any statistically significant differences between the demographic groups. Only groups with more than 15 participants were used to determine statistical significance.

Results

Profile of Overall Group

We first determined the mean implementation profile for all participants (N=179). To do this, we determined the score for each participant on each of the eight implementation conditions, summed the total and calculated the group mean. As mentioned earlier, it was possible to score from 0 to 14 on each condition. A higher score denotes that a condition was selected from the paired force choice statements more often than a condition with a lower score. The mean score for each condition ranged from 4.42 for the condition of commitment, to the highest mean response of 8.39 for resources. Table 1 shows the mean score for all 179 participants on each condition.

Table 1. Mean Score (0-14) for Each of Ely's Eight Conditions Ranked from Highest to Lowest

Rank	Condition	<i>N</i>	<i>M</i>	<i>SD</i>
1	Resources	179	8.39	2.980
2	Participation	179	8.11	4.137
3	Skills	179	7.98	3.704
4	Rewards	179	7.36	3.762
5	Dissatisfaction	179	7.24	4.260
6	Time	179	7.13	3.290
7	Leadership	179	5.37	3.456
8	Commitment	179	4.42	3.808

The rank order of the eight conditions, as shown in Table 1, indicates resources, participation, and skills and knowledge are the three most often selected conditions. This suggests that having sufficient resources, participating in the decision-making process, and having adequate skills and knowledge are the conditions most important for the implementation of an innovation. Leadership and commitment were perceived as the least important conditions in this study.

Comparison of Various Demographic Groups

We also collected demographic information to determine if there were differences in the relative importance of each condition based on age, gender, ethnicity, educational level, career field, and technical proficiency. Only demographic groups that consisted of 15 or more respondents were used in the analysis.

Age

The variable of age was analyzed to determine if age appeared to affect the relative importance of the eight implementation conditions. The results for each age group are shown in Table 2.

Table 2. Mean Score (0-14) for Each of Ely's Eight Conditions by Age

	26-30 (n=29)	31-35 (n=23)	36-40 (n=21)	40-45 (n=26)	46-50 (n=24)	51-55 (n=23)	56-60 (n=15)
Dissatisfaction with Status Quo	7.00	8.43	7.90	8.38	3.75	8.13	6.07
Skills and Knowledge	9.48	7.70	7.43	7.35	9.17	7.57	6.80
Resources	6.83	7.87	8.24	8.38	9.38	8.87	9.87
Time	7.31	7.65	6.62	7.77	7.88	6.22	6.47
Participation	8.45	6.74	8.43	8.04	7.21	9.09	8.00
Rewards and Incentives	6.69	9.00	9.38	6.58	7.96	6.48	6.07
Commitment	4.90	3.78	3.76	4.38	4.38	4.87	5.73
Leadership	5.34	4.83	5.24	5.12	6.29	4.78	7.00

Descriptive data indicate that there are differences on all 8 conditions based on age. The rank order for each age group is shown in Table 3. An analysis of variance determined statistically significant differences by age on two conditions: dissatisfaction with the status quo ($p=.001$) and resources ($p=.04$). The data show that resources were a more important condition to older participants than to younger ones. This could indicate that those attempting to foster the implementation of an innovation among an older population should pay particular attention to providing adequate resources. More research is needed to determine the pattern of variability for dissatisfaction with the status quo and age. Results for dissatisfaction with the status quo are somewhat harder to interpret and require more research to clarify.

Table 3: Rank Order of Ely's Eight Conditions for Various Age Groups

Rank	26-30	31-35	36-40	40-45	46-50	51-55	56-60
1	Skills	Rewards	Participation	Dissatisfact. / Resources	Resources	Participation	Resources
2	Participation	Dissatisfact.	Rewards		Skills	Resources	Participation
3	Time	Resources	Resources	Participation	Rewards	Dissatisfact	Leadership
4	Dissatisfact.	Skills	Dissatisfact.	Time	Time	Skills	Skills
5	Resources	Time	Skills	Skills	Participation	Rewards	Time
6	Rewards	Participation	Time	Rewards	Leadership	Time	Dissatisfact. / Rewards
7	Leadership	Leadership	Leadership	Leadership	Commitment	Commitment	
8	Commitment	Commitment	Commitment	Commitment	Dissatisfact.	Leadership	Commitment

Gender

Eighty-six females and 54 males participated in the study (39 participants did not state their gender). The mean score for each condition by gender is shown in Table 4.

Table 4. Mean Score (0-14) for Each of Ely's Eight Conditions by Gender

	Female (n=86)	Male (n=54)
Dissatisfaction with Status Quo	6.81	7.65
Skills and Knowledge	8.72	7.59
Resources	8.56	8.04
Time	7.38	6.87
Participation	7.87	8.63
Rewards and Incentives	6.78	7.28
Commitment	3.95	5.07
Leadership	5.92	4.87

Females reported “skills and knowledge” and “availability of resources” to be the most important conditions for implementation while males reported “participation” and “availability of resources” as the most important. Analyses of variance determined there were no statistically significant differences between the responses of females and males for any of the eight conditions.

Ethnicity

Of the 179 participants, 138 reported their ethnic background as Caucasian. All other ethnic groups were comprised of fewer than 15 participants each. Because there were relatively few participants in most ethnic categories, we did not conduct any statistical analysis in this area. Future research in this area should attempt to identify a more ethnically diverse sample in order

to determine if there are any differences in the relative importance of the eight implementation conditions based on ethnicity.

Educational Level

Educational attainment among the participants in this study ranged from high school diploma or equivalent to doctoral or professional degrees. The results from the educational level groups that consisted of 15 or more participants were analyzed and included participants with high school diplomas or equivalent, undergraduate college degrees, Master's degrees, and Doctoral or professional degrees. The means for each group on each condition are shown in Table 5.

Table 5. Mean Score (0-14) for Each of Ely's Eight Conditions by Educational Level

	High School (n=32)	Undergraduate (n=42)	Master's (n=71)	Doctoral or professional (n=26)
Dissatisfaction with Status Quo	5.72	7.93	7.24	8.77
Skills and Knowledge	9.34	8.45	7.44	6.85
Resources	8.16	8.36	8.15	9.38
Time	8.19	7.17	7.11	6.46
Participation	7.69	7.79	8.49	7.96
Rewards and Incentives	6.91	6.83	7.65	7.92
Commitment	4.47	4.07	4.37	4.42
Leadership	5.53	5.40	5.55	4.23

Statistically significant differences in the participants' responses were found on three of the conditions: dissatisfaction with the status quo ($p=.036$), skills and knowledge ($p=.046$), and resources (.018). As educational level increases, the importance of dissatisfaction with the status quo and availability of resources also increase. From a practical standpoint, this means that people with higher educational levels are less likely to go along with a change if they think the

current way of doing things is acceptable. Change agents should emphasize the advantages of an innovation or point out problems with the status quo when working with a more highly educated population. The importance of resources also increases with educational level. This could mean that those with higher education are less likely to go along with a change if they feel that the supporting resources and technologies are not in place.

Level of education and the condition “skills and knowledge” are inversely related. People with higher degrees tended to place less importance on having the skills and knowledge needed to implement an innovation. We theorize that people with more education feel that they can pick up the needed skills and knowledge or are more comfortable “learning as they go.” Change agents who are working with less educated populations should ensure that those effected by the change have the skills and knowledge needed to effectively implement the innovation. Table 6 shows the rank of each condition for each educational group.

Table 6. Rank Order of Ely’s Eight Conditions by Educational Level

Rank	High School	Undergraduate	Master’s	Doctoral or Professional
1	Skills	Skills	Participation	Resources
2	Time	Resources	Resources	Dissatisfaction
3	Resources	Dissatisfaction	Rewards	Participation
4	Participation	Participation	Skills	Rewards
5	Rewards	Time	Dissatisfaction	Skills
6	Dissatisfaction	Rewards	Time	Time
7	Leadership	Leadership	Leadership	Commitment
8	Commitment	Commitment	Commitment	Leadership

Career Field

Participants were asked to select among 30 job categories in order to determine the relationship between career field and Ely's eight conditions. The majority of the respondents in this study were from higher education fields. Most categories consisted of fewer than 15 participants. Because most job categories had relatively few participants, we did not conduct any statistical analyses on this variable. Further research is needed using fewer categories for job titles and including more participants from business and industry.

Technology Proficiency

Participants were asked to report their technology proficiency from very low to very high. The descriptive results for the technology proficiency groups with 15 or more participants included participants with average, high, and very proficiency levels and are illustrated in Table 7.

Table 7. Mean Score (0-14) for Each of Ely's Eight Conditions by Technology Proficiency

	Average (n=51)	High (n=68)	Very High (n=53)
Dissatisfaction with Status Quo	7.24	7.40	7.40
Skills and Knowledge	9.94	7.59	6.66
Resources	8.63	8.72	7.98
Time	7.78	7.03	6.38
Participation	6.43	8.06	9.74
Rewards and Incentives	6.63	7.68	7.51
Commitment	4.04	4.07	5.04
Leadership	5.31	5.46	5.30

Regarding the variable of technology proficiency, the condition of skills and knowledge is statistically significant at .000 and the condition of participation is statistically significant at .003. As proficiency levels increase, scores depicting the importance of the skills and knowledge

condition decrease, suggesting that skills and knowledge are less important to participants with higher technology skills than those with lower technology skills. Conversely, participation in the decision-making process is more important to those with higher technology skills, as illustrated by a positive relationship between increase in importance of participation and increase in proficiency level. The rank order for each condition by group based on their technology proficiency is shown in Table 8.

Table 8. Rank Order of Ely's Eight Conditions by Technology Proficiency

Rank	Average	High	Very High
1	Skills	Resources	Participation
2	Resources	Participation	Resources
3	Time	Rewards	Rewards
4	Dissatisfaction	Skills	Dissatisfaction
5	Rewards	Dissatisfaction	Skills
6	Participation	Time	Time
7	Leadership	Leadership	Leadership
8	Commitment	Commitment	Commitment

Very few participants were included in the low and very low technology skills groups. More research is needed to determine the perceptions of those with low technology skills.

Discussion

The results of this study support the theory that dissatisfaction with the status quo, skills and knowledge, availability of resources, availability of time, participation, rewards, commitment, and leadership are all necessary conditions for the successful implementation of a new innovation. Overall, the availability of resources was identified as the most important condition. However, based on the demographic groups of age, gender, ethnicity, educational level, career field, and technology proficiency the average profile, or ranking of importance, varied among each group. The conditions of commitment and leadership consistently ranked as less important than the other conditions.

The results of the study indicate statistical significance in the perceived importance of Ely's eight conditions for implementation by the demographic variables of age, educational degree, and technology proficiency. This suggests that when an organization begins to implement an innovation, diversity in the age, degree level, and technology proficiency of the end-users are important factors to consider when designing the implementation plan. For example, based on the results of the data, we hypothesize that individuals with higher educational degrees and technology proficiency levels perceive skills and knowledge as less important than those with lesser degrees or technology proficiencies and therefore feel they can easily acquire the skills required for implementation. Consequently, when implementing an innovation, it might be more effective to focus training on a specific group of individuals with lower educational degrees and technology proficiency levels.

Successful implementation is dependent upon more than simply the merits of the innovation. The implementation process, itself, must be well defined. The results of this study indicate that the perceived importance of conditions for implementation differs among demographic variables. The results of the study can be used to design implementation plans that consider the unique demographic characteristics an organization. By evaluating and accounting for the demographic characteristics described in this paper, change managers can design more effective implementation plans and facilitate the introduction of innovations within their organizations.

Limitations and Suggestions for Future Research

Statistical significance in the demographic areas of age, educational degree, and technology proficiency suggests that implementation profiles differ among these demographic variables. More research is needed to more precisely determine the average implementation profiles for each age, educational degree, and technology proficiency group. A study with more ethnic diversity is required to determine if there are differences by ethnicity on the eight conditions. In the future, a study with the categories of only business and education would be beneficial to conclude if differences in perceptions exist between career fields. Also, a higher number of participants from business fields and lower technology proficiency is necessary to determine statistical significance in these demographic areas. While a clear difference in the perceived importance of Ely's conditions is illustrated by this study, the implications on the success of implementing innovations based on this information requires further research.

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